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EXAMINER

SAID, MANSOUR M

ART UNIT

PAPER NUMBER

2673

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/026,934

Applicant(s)

SULLIVAN ET AL.

Examiner

MANSOUR M. SAID

Art Unit

2673

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5-20, 22-33, 35-36, 38-41, 44, AND 47-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-20, 22-33, 35-36, 38-41, 44, AND 47-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is in respond to the amendment filed on September 22, 2004. New Claims 47-54 have been added, and claims 4, 21, 31, 34-35, 37, and 42-46 have been canceled.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-10, 22-23, 25-26, 38-40, 52, 54-56, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano (6,549,185 B1) in view of Nakagawa et al. (4,870,486; hereinafter referred to as Nakagawa).

As to claim 1, Hatano teaches a light scattering shutter comprising (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67); a liquid crystalline material comprising a chiral liquid crystal capable of forming a light scattering state and a transparent state (figures 1-2, column 5, lines 48-67, column 6, lines 3-39 and column 7, line 55 through column 8, line 21); and a voltage source operative to provide a varying voltage across said liquid crystalline material to switch said liquid crystalline material between said transparent state and said t light scattering state ((figures 2A-B, 5A-B & 6A-B, column 8, lines

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1-21, column 9, lines 1-13, column 9, line 55 through column 10, line 2, column 10, lines 43-60 and column 11, lines 17-36).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 3**, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (column 6, lines 20-39, and column 10, lines 26-40).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 4**, Hatano teaches wherein said first and second substrates (glass plates, (figure 1, (1)) are comprised of a material selected from the group consisting of glass and plastic (column 5, lines 50-59).

**As to claim 5**, Hatano teaches wherein the chiral liquid crystal is selected from the group consisting of cholesteric liquid crystal, nematic liquid crystal, and smectic chiral liquid crystal (column 4, lines 45-50 and column 5, line 60 through column 6, line 2).

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**As to claim 6**, Hatano teaches wherein said liquid crystalline material comprises a nematic liquid crystal and a chiral dopant (column 4, lines 45-50 and column 5, lines 54-67).

**As to claim 7**, Hatano teaches wherein liquid crystalline material is substantially polymer free (column 7, lines 48-54).

**As to claim 8**, Hatano teaches wherein the chiral liquid crystal has a positive dielectric anisotropy (column 1, lines 22-23).

**As to claims 9-10**, Hatano teaches all claimed limitations except a transient light scatter shutter and dc bipolar voltage/reverse polarity.

However, Nakagawa teaches a transient light scatter shutter and dc bipolar voltage/reverse polarity (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state polarity reverse voltage into Hatano's device so increase the versatility of the display device.

**As to claim 22**, Hatano teaches a liquid crystalline material as a light scattering shutter (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), liquid crystalline material comprising a chiral liquid crystal (figure 1, (3a)) (column 5, lines 50-61, applying a first electric field (first voltage pulse) to the shutter (figure 1, (1-2)) to form a first transparent state (transmissive state) (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), adjusting the first electric field (first voltage pulse) to zero ( $V_0$ ) volts to form a transient light scattering state (figure (figures 2A-B, 3A 5A-B & 6A-B) ; abstract and column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67; and

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applying a second electric field (second voltage pulse) to the shutter to form a second transparent state (column 5, lines 35-42 and column 6, lines 50-62).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 23**, Hatano teaches wherein said first electric field (first voltage pulse) and said second electric field (second voltage pulse) are in opposite directions (column 5, lines 36-45).

**As to claim 25**, Hatano teaches all claimed limitations except a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 26**, Hatano teaches a liquid crystalline material as a light scattering shutter (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), liquid crystalline material comprising a chiral liquid crystal (figure 1, (3a)) (column 5, lines 50-61, applying a first electric field (first voltage pulse) to the shutter (figure 1, (1-2)) to form a first transparent state (transmissive state) (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), adjusting the first electric field (first

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voltage pulse) to zero ( $V_0$ ) volts to form a transient light scattering state (figure (figures 2A-B, 3A 5A-B & 6A-B) ; abstract and column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67; and applying a second electric field (second voltage pulse) to the shutter to form a second transparent state (column 5, lines 35-42 and column 6, lines 50-62).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 38**, Hatano teaches wherein transition time of the liquid crystalline material from the transparent state to light scattering state in about 0.34 msec (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67 and column 7, lines 1-4).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 39**, Hatano teaches wherein transition time of the liquid crystalline material from said light scattering state to said transparent state in about 0.45 msec (figures 2A-B, 5A-B

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& 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67 and column 7, lines 1-4).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

**As to claim 40**, Hatano teaches a plurality light scattering shutter (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) the material ((conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising a chiral liquid crystal (chiral nematic liquid crystal, ((figure 1, (3a)) & (column 5, lines 53-55)) capable of forming a light scattering state and a transparent state (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67 and a voltage source a varying voltage across the liquid crystalline material to switch the liquid crystalline material between the transparent state and a light scattering (figures 2A-B, 5A-B & 6A-B, column 8, lines 1-21, column 9, lines 1-13, column 9, line 55 through column 10, line 2, column 10, lines 43-60 and column 11, lines 17-36).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.



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**As to claim 47**, Hatano teaches all claimed limitations except a transient light scatter shutter, and the varying voltage is an AC voltage.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18), the varying voltage is an AC voltage (column 13, lines 45-59).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state and AC voltage into Hatano's device so increase the versatility of the display device.

**As to claim 48**, Hatano teaches wherein the varying voltage is a unipolar voltage (figures 3B, 4B, 5B and 7B)).

**As to claim 52**, Hatano teaches wherein the first electric field and the second electric field are in same direction (figures 3B, 4B, 5B and 7B, column 2, lines 42-60, column 6, lines 20-29, column 6, lines 50-62, column 9, lines 35-43, and column 16, lines 45-50)..

**As to claim 54**, Hatano teaches wherein the first voltage (130V, (figure 3B)) and second voltage (V2, (figure 3B)) have same polarities (figures 3B, 4B, 5B and 7B)).

**As to Claim 55**, Hatano teaches wherein said varying voltage comprises a periodic waveform to allow adjacment of both a repetition rate and duration of said liquid crystalline material in said transient light scattering state (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40).

**As to claim 56**, Hatano teaches wherein the slope of said periodic waveform controls said duration. (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40).

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**As to claim 61**, Hatano teaches a method of using a liquid crystalline material

light scattering shutter (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67), comprising the steps of providing said liquid crystalline material (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67) comprising a chiral liquid crystal capable of forming a transparent state (figures 1-2, column 5, lines 48-67, column 6, lines 3-39 and column 7, line 55 through column 8, line 21) and a light scattering state (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67); providing a voltage source capable of providing a varying voltage in a periodic waveform (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40); adjusting the slope of said periodic waveform to control a duration of said liquid crystalline material in said transient light scattering state (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40); and applying said varying voltage across said liquid crystalline material (figures 2A-B, 5A-B & 6A-B, column 8, lines 1-21, column 9, lines 1-13, column 9, line 55 through column 10, line 2, column 10, lines 43-60 and column 11, lines 17-36).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

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**7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Nakagawa as applied to claim 1 above, and further in view Urabe et al. (4,639,722; hereinafter referred to as Urabe).**

Hatano and Nakagawa teach all claimed limitations in claim 2 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

**4. Claims 11, 13-16, 20, and 27-30, 49-51, and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Nakagawa, and further in view of Tsao (6,302,542 B1).**

As to claim 11, Hatano teaches a plurality light scattering shutter (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) the material ((conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising a chiral liquid crystal (chiral nematic liquid crystal, ((figure 1, (3a)) & (column 5, lines 53-55)) capable of forming a light scattering state and a transparent state (figures 2A-B, 5A-B & 6A-B, column 3, lines 20-31, column 4, lines 54-63 and column 6, lines 20-67 and a voltage source a varying voltage across the liquid crystalline material to switch the liquid crystalline material between the transparent state and a light

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scattering (figures 2A-B, 5A-B & 6A-B, column 8, lines 1-21, column 9, lines 1-13, column 9, line 55 through column 10, line 2, column 10, lines 43-60 and column 11, lines 17-36).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

Hatano and Nakagawa do not expressly disclose that multi surface optical with a 3-D projection image.

However, Tsao teaches multi surface optical with a 3-D projection image (figures 1, & 9-10; abstract; column 1, lines 11-22; column 3, lines 29-34 and column 5, lines 55-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having 3-D projector into Hatano's modified system device so as to improve for displaying volumetric three-dimensional (3D) images (abstract).

**As to claim 13**, Hatano and Tsao teach all claimed limitations except a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's modified device so increase the versatility of the display device.

**25**, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (figures 2-4; abstract; and column 6, lines 50-67).

**As to claim 14**, Hatano and Nakagawa teach all claimed limitations **but omit that a** second image projector coupled to receive the projected images from the first image projector multi-optical device.

However, Tsao teaches that a second image projector (optical-mechanical) coupled to receive the projected images from the first image projector (image projector, (figure 1, (15)) including multi-optical (figures 6-7, abstract ; column 1, lines 13-22; column 1, lines 60-62 and column 5, lines 55-67); the second image projector ((optical-mechanical)) comprising optics to project the three-dimensional image at a location in space distant from the optical device (abstract; column 1, lines 13-23; column 2, lines 18-27), said projected three-dimensional image appearing to float in space (abstract; column 1, lines 13-22; column 1, lines 48-52 and column 10, lines 57-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having 3-D projector into Hatano's modified system device so as to improve for displaying volumetric three-dimensional (3D) images (abstract).

**As to claim 15**, Hatano teaches a controller (drive circuit, (figure 8, (B)) that comprises a controller (drive circuit, (figure 8, (B'))), generating operative to control the state of each the shutter (column 6, lines 20-29; column 8, lines 66-67 and column 9, lines 13), wherein one the shutter is in the transient light scattering state to receive and display the respective image

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(column 12, lines 10-15), while the other said shutters are in the transparent state to allow viewing of the respective image on the one shutter (column 12, lines 27).

Hatano does not expressly teach a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's device so increase the versatility of the display device.

Hatano and Nakagawa do not expressly disclose that a computer processor controller

However, Tsao teaches computer processor controller (microprocessor) (column 6, lines 1-3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's modified device so as to have a relative image (column 6, lines 1-2).

**As to claim 16**, Hatano and Tsao teach all claimed limitations s except that a transient light scatter shutter.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state into Hatano's modified device so increase the versatility of the display device.

**As to claim 20**, Hatano and Tsao teach all claimed limitations except a transient light scatter shutter and dc bipolar voltage/reverse polarity.

However, Nakagawa teaches a transient light scatter shutter and reverse polarity voltage (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state polarity reverse voltage into Hatano's modified device so increase the versatility of the display device.

**As to claim 27**, Hatano teaches wherein the liquid crystalline material transmits greater than about 85% (more than 65%) of incident visible spectrum light while in said transparent state (column 6, lines 40-49).

**As to claim 28**, Hatano teaches wherein the liquid crystalline material transmits less than about 1% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

**As to claim 29**, Hatano teaches wherein the liquid crystalline material transmits less than about 0.5% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

**As to claim 30**, Hatano teaches wherein the liquid crystalline material transmits less than about 0.1% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

**As to claim 49**, Hatano and Tsao teach all claimed limitations except the varying voltage is an AC voltage.

However, Nakagawa teaches transient light scatter shutter (column 21, lines 12-18), the varying voltage is an AC voltage (column 13, lines 45-59).

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Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state and AC voltage into Hatano's device so increase the versatility of the display device.

**As to claim 50**, Hatano teaches wherein the varying voltage is a unipolar voltage (figures 3B, 4B, 5B and 7B)).

**As to claim 51**, Hatano teaches all claimed limitations except a transient light scatter shutter and dc bipolar voltage/reverse polarity.

However, Nakagawa teaches a transient light scatter shutter and dc bipolar voltage/reverse polarity (column 21, lines 12-18).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to combine Nakagawa's device having a transient light scattering state polarity reverse voltage into Hatano's device so increase the versatility of the display device.

**As Claim 58**, Hatano teaches wherein said varying voltage comprises a periodic waveform to allow adjacment of both a repetition rate and duration of said liquid crystalline material in said transient light scattering state (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40).

**As to claim 59**, Hatano teaches wherein the slope of said periodic waveform controls said duration. (figure 2A-B, 3A-B, 4A-B, 5A-B & 6A-B, column 15, lines 29-36, column 16, lines 36-50, column 17, lines 4-6, column 17, lines 19-35, and column 18, lines 25-40).



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**5. Claims 12, 24 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano and Nakagawa in view of Tsao as applied to claims 11, 22 and 26 above, and further in view of Urabe et al. (4,639,722; hereinafter referred to as Urabe).**

As to claims 12, 24 and 33, Hatano, Nakagawa and Tsao teach all claimed limitations except that a heater operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

**6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano and Nakagawa in view of Tsao as applied to claim 11 above, and further in view of McDowall et al. (6,535,241 B1; hereinafter referred as McDowall).**

Hatano, Nakagawa and Tsao disclose all claimed limitations in claim 17, but omit that a projector projects each image of said set of images at a rate of no less than about 35 Hz.

However, McDowall teaches a projector projects each image of said set of images at a rate of no less than about 35 Hz. (column 8, lines 39-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate McDowall's teaching into Hatano's modified system so as to modulate the light coming for the projector (column 8, line 41).

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**7. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano and Nakagawa in view of Tsao as applied to claim 11 above, and further in view of Suyama et al. (6,469,683; hereinafter referred to as Suyama).**

As to claims 18-19, Hatano, Nakagawa and Tsao teach all claimed limitations except that the shutters are equally spaced apart from each other.

However, Suyama teaches a shutters (figure 53, (202)) (column 35-67 and column 39, lines 3-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Suyama's teaching having shutters into Hatano's modified system so to obtain a three-dimensional image without any phantom image position (column 39, lines 6-7).

**8. Claims 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano and Nakagawa in view of Tsao as applied to claims 26 above, and further in view of Andersson et al. (6,130,731; hereinafter referred to as Andersson).**

Hatano, Nakagawa and Tsao teach all claimed limitations in claim 32 but omit that the scattering light spectrum selected from an ultraviolet and a near infrared.

However, Andersson teaches the scattering light spectrum selected from an ultraviolet and a near infrared (column 9, lines 49-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Andersson's teaching into Hatano's modified system so as to increase the versatility of the display device.

**9. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Nakagawa as applied to claim 11 above, and further in view of Urabe et al. (4,639,722; hereinafter referred to as Urabe).**

Hatano and Nakagawa teach all claimed limitations in claim 33 except that a heater operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

**10. Claims 36 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Nakagawa and further in view of Urabe.**

As to claim 36, Hatano and Nakagawa teach all claimed limitations except that wherein said heating comprises heating said material to about 65 degree C.

However, Urabe teaches wherein said heating comprises heating said material to about 65 degree C (column 4, lines 26-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

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**11. Claims 57 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Nakagawa as applied to claim 1 & 61 above, and further in view of Takatori et al. (6,040,889; hereinafter referred to as Takatori).**

As to claims 57 & 62, Hatano and Nakagawa teach all claimed limitations except that waveform is a truncated triangular wave.

However, Takatori fairly teaches a waveform is a truncated triangular wave (column 6, lines 3-6 and column 10, lines 1-30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Takatori's device having a triangular wave into Hatano's modified system so as to have a low voltage and analog tone characteristic that is virtually free from hysteresis, so as the device can be easily combined with active elements such as thin-film transistors (column 10, lines 25-30).

**12. Claim 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano and Nakagawa in view of Tsao as applied to claim 1 & 61 above, and further in view of Takatori et al. (6,040,889; hereinafter referred to as Takatori).**

Hatano, Nakagawa and Tsao teach all claimed limitations in claim 60 except that waveform is a truncated triangular wave.

However, Takatori fairly teaches a waveform is a truncated triangular wave (column 6, lines 3-6 and column 10, lines 1-30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

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invention was made to incorporate Takatori's device having a triangular wave into Hatano's modified system so as to have a low voltage and analog tone characteristic that is virtually free from hysteresis, so as the device can be easily combined with active elements such as thin-film transistors (column 10, lines 25-30).

***Response to Arguments***

**13. Applicant's arguments with respect to claims 1-3, 5-230, 32-33, 36, and 38-41 have been considered but are moot in view of the new ground(s) of rejection.**

***Conclusion***

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS OFFICE ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mansour M. Said

whose telephone number is 571-272-7679. The examiner can normally be reached on Monday through Friday from 7:00 A.M. to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

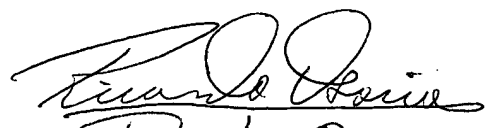
or faxed to:

571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

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Mansour M. Said  
9/16/05

  
Ricardo Osorio  
PRIMARY EXAMINER